U. S. DEPARTMENT OF AGRICULTURE

Forest Service

APPALACHIAN FOREST EXPERIMENT STATION

Technical Note No. 45

Asheville, N. C.
May 20, 1941.

A PRELIMINARY GUIDE FOR THE REFORESTATION OF OLD FIELDS IN THE GREAT APPALACHIAN VALLEY AND ADJACENT MOUNTAIN REGIONS

By

Leon S. Minckler, Assistant Forester

Abandoned fields in the Great Appalachian Valley and adjacent foothills comprise one of the broad planting problem areas in the southern Appalachian region. In 1938 and 1939, investigations were started by the planting of about 700 experimental plantations so distributed as to sample adequately all major old field site conditions. The work was done in cooperation with the Department of Forestry Relations of the Tennessee Valley Authority, and represents a joint effort to determine the relations between success of various species of trees and some simple, easily determined site characteristics. While final conclusions must await a longer period of tests, the planting chart which follows is a practical expression of research results to date. It is based on the third year survival and growth results of the 1938 plantings.

Planting Chart Legend

1/ Start at left side of chart and progressively fit prospective planting site into proper compartments until recommended species are reached.

2/ If the upper half of the B horizon is friable (see footnote 4), the minimum depths of A horizon can be reduced. In general, 2 inches of friable B horizon can be substituted for one inch of A horizon. The presence of a deep, friable B horizon in combination with a deep A horizon constitutes an excellent site. Areas long out of cultivation with sheet erosion arrested are superior to recently abandoned sites with a similar soil profile.

3/ Northwest, north, northeast, and east facing slopes.

4/ The terms friable, plastic, and stiff are commonly used to denote the consistency of soils. Friable denotes a loose, crumbly, loamy soil easily permeable to air and water. It cannot be molded into an adhesive ball by pressing in the hands, even at high moisture contents. Agriculturists usually consider such a soil to be in good tilth.

A plastic soil is stickier, less permeable to air and water, and has a larger proportion of the fine clay particles. It can be molded into a soft, flexible, adhesive ball when wet but tends to be loose when dry or moderately dry. It is not in any sense a "hardpan" and offers no practical resistance to root penetration.

A stiff soil has a dense, often hard, consistency and is relatively impermeable to air and water. It is usually a clay or silty clay, very adhesive when wet and compact when dry. It is often considered a hardpan or near hardpan and offers considerable resistance to the penetration of roots as well as air and water.

5/ Very dense briars, weeds, or brush almost never occur on these site conditions.

6/ West, southwest, south, and southeast facing slopes.

Planting Chart[1]-Recommended epeciee for the Appalachian Valley and adjacent mountain regions.

Aspect	Soil depth [2]	Topographic poeition	Desirable eoil condition	SPECIES AND MIXTURES RECOMMENDED	
				Areas with very dense briare, weede or brush.	Areas with normal vegetative deneity or less. Includee all broomsedge.
Northerly slopes[3] or well drained bottoms	The A soil horizon over 7 inches	Lower slopes, well drained bottoms and sink holes	A horizon friable. Upper half of B horizon friable or plastic, not stiff.[4] Soil well aerated.	Yellowpoplar Black walnut Yellowpoplar-Black walnut mixture A	Yellowpoplar Black walnut White ash Shortleaf pine-Yellow-poplar mixture Yellowpoplar-Black B walnut mixture
		Upper slopes	Same ae above	Yellowpoplar White pine-Yellow-poplar mixture C	White pine-Yellowpoplar mixture Shortleaf pine-Yellow-poplar mixture D White aeh
	The A soil horizon 5 to 7 inches	Lower slopes	Same as above	White pine-Yellow-poplar mixture E	White pine White pine-Yellowpoplar mixture White pine-Shortleaf F pine mixture
		Upper elopes	A horizon friable and well aerated. No special requirement for B horizon	[5] G	White pine White pine-Shortleaf pine mixture
	The A soil horizon under 5 inches, usually eroded	All positions	No epecial requirement	[5] H	Shortleaf pine
Southerly slopes[6] or ridge tops	The A soil horizon over 12 inches	Extreme lower elopee, covee, & sink holee	A horizon friable. Upper half of B horizon friable or plastic, not stiff.[4] Soil well aerated.	Yellowpoplar Black walnut Yellowpoplar-Black walnut mixture I	White pine-Yellowpoplar mixture White aeh Shortleaf pine-Yellow-poplar mixture J
	The A soil horizon 7 to 12 inchee	Slopee not steeper than 30% & broad ridge tops	A horizon friable and well aerated. No epecial requirement for B horizon.	[5] K	White pine White pine-Shortleaf pine mixture Shortleaf pine
		Slopee over 30% steepneee	No special requirement	[5] L	Shortleaf pine
	The A soil horizon under 7 inches	All poeitions	No epecial requirement	[5] M	Shortleaf pine

Some Specific Results

In order to substantiate and further clarify the planting chart, a few comparisons of plantation success on the different site categories will be given. In the following comparisons sites are identified by the same key letters appearing on the chart in the lower left corner of the compartments under "Species and Mixtures Recommended."

1. On site B, yellowpoplar made a mean height growth in 2 years of 2.4 feet as contrasted with 1.3 feet on site G.

2. Shortleaf pine had a survival of 43 percent on sites A, C, and E, and 93 percent on sites F, G, and H.

3. On sites A, B, and I, black walnut has reached heights of 3 to 6 feet. On all other sites growth has been negligible.

4. The importance of the condition of the B soil horizon is illustrated by the following comparison on sites A, B, C, and D. On friable, plastic, and stiff B horizons, yellowpoplar mean height growth in 2 years was 2.5, 1.5, and 0.8 feet, respectively. White ash showed a similar response to differences in the condition of the B soil horizon.

5. Justification for the substitution of friable B horizon for depth of A horizon is given by the following: yellowpoplar on site E with friable B horizon grew 1.6 feet in 2 years, while on sites A, B, C, D, with a plastic B horizon it had a mean growth of 1.5 feet. White ash showed the same tendency.

6. Shortleaf pine makes about the same growth on sites recommended for it as on the better sites. This species had a mean height growth in 2 years of 2.4 feet on site M, and 2.7 feet on site K. It grew 2.6 feet on site H as compared with 2.5 feet on all better sites.

7. White pine and yellowpoplar failed almost completely on site M when the slope steepness was more than about 40 percent.

Species Mixtures

In using the planting chart it is suggested that mixtures, rather than pure plantings, be used wherever possible. Probably the best type of mixture is by square groups like a checkerboard. Groups of 9 trees of one species were used in the experimental plantings although there is no apparent objection to somewhat larger groups.

"Sweetening" of Poor Existing Stands

Interplanting or underplanting of sassafras and poorly stocked shortleaf pine stands so common on old fields in the Appalachian Valley can also be successfully accomplished. Yellowpoplar, white pine, and shortleaf pine have given good results under head high stands of sassafras. The densest sassafras should be planted to yellowpoplar and the sparse stands on poor sites to shortleaf. Understocked stands of young, nearly even-aged shortleaf pine with large spaces between trees occupied by broomsedge can usually be successfully interplanted by selecting species according to the planting chart.

Rodent Damage

The presence or absence of large populations of rodents is an important consideration in any planting of hardwoods. Hardwood species have been damaged in about the following order of severity: (1) oak seedlings, (2) red gum, (3) black locust, (4) white ash, and (5) black walnut and yellowpoplar. Heavy broomsedge cover is the favorite home of field mice and it appears necessary to avoid planting oak or red gum in such areas. The 6 species of oak tested have also exhibited very poor early growth on nearly all sites. Red gum made good growth only on the best sites. Pure plantations of the remainder of the above species should also be avoided if it is determined that damage may be especially severe. In these cases it would be advisable to plant pine or mix pine with hardwoods.

Black locust was not excessively damaged by rodents but growth data for this species help to verify the accumulating evidence that it requires deep, moist and well aerated soils for rapid and sustained

growth. Black locust probably should be confined to such places as fresh gully bottoms, road bank fills, and other places where soil has been mixed or recently accumulated. It is not generally recommended for old field planting.

Importance of Soil Type

In addition to the factors included in the chart, 3 extensive soil types were sampled by the experiments. The third year results have not shown differences in plantation success between soil types which cannot be accounted for by more specific local site characters. As further growth data become available, soil type may assume more significance and other site factors in the chart may change in importance. The planting chart should be regarded as a useful guide but one which is subject to change and improvement as time passes.